

The Relationships between Five-Factor Model Personality Traits and Personality Disorder Features in an Australian Non-Clinical Sample

Ninawa Butrus · Rivka T. Witenberg

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Abstract The aim of this study was to explore the relationships between personality traits from the Five-Factor Model (FFM) and personality disorder (PD) features in order to better understand personality disorders (PDs) from a dimensional perspective. An Australian non-clinical sample of 313 participants ($M=26.50$ years, $SD=10.10$, age range = 18–72 years) completed several self-report measures, including the NEO Personality Inventory–Revised and the Wisconsin Personality Disorders Inventory–IV. Correlations revealed unique and theoretically-meaningful relationships between FFM traits and PD features. Regressions clarified these relationships by identifying the most salient FFM trait predictors of PD features. These results have important theoretical and practical implications for understanding PDs from a dimensional perspective.

Keywords Personality traits · Personality disorders · Five-Factor Model · Traits · Personality

Critics of the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR; American Psychiatric Association [APA] 2000) personality disorder (PD) nosology have become increasingly interested in a dimensional alternative to the problematic categorical system of classifying personality disorders (PDs). Several competing dimensional models have been proposed (Trull and Durrett 2005), with the majority of these models focusing exclusively on empirically-

derived personality traits in the conceptualisation and measurement of PD constructs (Widiger and Simonsen 2005).

Personality traits are enduring dispositional tendencies commonly defined as “dimensions of individual differences in tendencies to show consistent patterns of thoughts, feelings, and actions” (McCrae and Costa 2003, p. 25). Proponents of dimensional trait models assert that combinations of general and/or maladaptive personality traits underlie and cut across the DSM-IV-TR categorical PD syndromes (Widiger et al. 2009). It can be argued that a substantial overlap in variance between measures of trait and PD constructs would indicate that the particular trait model adequately captures the range of personality pathology features encoded in the DSM-IV-TR PD categories and thus may be a suitable dimensional replacement for the existing categorical model of classifying PDs (Trull 2005).

In dimensional trait models PDs are not conceptualised as discrete diagnostic categories, rather they are viewed as representing extreme and maladaptive variants of continuous personality traits that “merge imperceptibly into normality and into one another” (APA 2000, p. 689). The goal of dimensional trait models of PDs is to identify the constellations of personality traits that underlie the features, symptoms or behavioural manifestations of personality pathology and to reconceptualise PDs using these trait dimensions (Widiger et al. 2009). A particular combination of salient traits in an individual’s multidimensional profile can then be summarised through the use of a label or matched to an existing diagnostic prototype, such as the DSM-IV-TR PD categories (Widiger et al. 2002a; Widiger and Mullins-Sweatt 2009). One promising dimensional trait model of PDs that has received increased research attention is the Five-Factor Model (FFM) of general personality trait structure (Widiger 2011). The FFM was the focus of the present research.

N. Butrus (✉) · R. T. Witenberg
School of Psychology, Australian Catholic University, Locked Bag
4115, Fitzroy, Melbourne, VIC 3065, Australia
e-mail: nbutrus@hotmail.com

R. T. Witenberg
e-mail: rivka.witenberg@acu.edu.au

The Five-Factor Model of General Personality Traits

As McCrae et al. (2005b) cogently pointed out, “If Axis II psychopathology is supposed to be a reflection of personality, then it would seem logical to base its classification on the structure of personality itself” (p. 270). Within the personality literature, the broad consensus is that normal or general personality traits can be organised around five higher-order dimensions (John et al. 2008). These five dimensions are Neuroticism, Extraversion, Openness to Experience (Openness), Agreeableness and Conscientiousness and they collectively constitute the FFM of personality structure (McCrae 2009). A large body of research points to the comprehensiveness, reliability, validity, utility and, most importantly, generalisability of the FFM in describing general personality traits (e.g., John et al. 2008; McCrae and Costa 2008). For example, studies have shown that the FFM structure can be replicated across cultures (McCrae and Allik 2002; McCrae et al. 2005a). Further, research has also shown that FFM trait scores reach a plateau in early adulthood (Terracciano et al. 2006, 2010). The implication is that FFM traits become more stable with age, yet there may be some variability in FFM trait scores during young adulthood.

The FFM is an empirically-derived hierarchical model of general personality trait structure that encompasses higher- and lower-order trait dimensions (McCrae and Costa 2003). For example, within the most widely-used measure of the FFM, the NEO Personality Inventory—Revised (NEO-PI-R; Costa and McCrae 1992), the hierarchical structure of the FFM is operationalised in terms of the five higher-order dimensions, known as domains, each of which subsume six lower-order traits, known as facets. The NEO-PI-R was used in the present research and will be described in more detail later.

The Five-Factor Model and Personality Disorders

A large body of research using clinical and non-clinical samples has provided support for the idea that DSM-IV-TR PDs can be understood as extreme and maladaptive variants of the FFM domains (see Widiger and Costa 2002, for an overview). Saulsman and Page (2004) performed a meta-analysis of data from 12 studies and found meaningful, though modest, effect size estimates regarding the relationships between PDs and FFM domains. Specifically, they found that all PDs were characterised by a positive relationship with Neuroticism and a negative relationship with Agreeableness, with the exception of dependent PD which was positively correlated with Agreeableness. They also found that Extraversion and to a lesser extent Conscientiousness played a discriminatory role

across the PD categories. For example, whereas most PDs were negatively related with Extraversion, the histrionic and narcissistic PDs were positively related with Extraversion. Likewise, whereas most PDs were negatively related with Conscientiousness, obsessive-compulsive PD was positively related with Conscientiousness. In contrast, Openness evidenced little relationship with PDs, leading Saulsman and Page to conclude that Openness “serves no prominent role” in PD-FFM trait relationships (p. 1076). Overall, these findings suggest that most PDs can generally be described as enduring patterns of emotional maladjustment (high Neuroticism), interpersonal antagonism (low Agreeableness) and either detachment or gregariousness (low or high Extraversion) and behavioural under-control or over-control (low or high Conscientiousness), depending on the specific PD category involved (Saulsman and Page 2004).

Given that most PDs share a similar FFM domain-level profile, researchers have suggested that a richer description and better differentiation of PDs may be achieved by conducting studies at the lower-order level of FFM facet traits (Clark 1993b; Dyce and O'Connor 1998). To facilitate research at this level, Widiger et al. (1994, 2002b) hypothesised a set of directional relationships between specific PDs and FFM facet traits. The 1994 set of hypothesised PD-FFM facet trait relationships were based on the clinical literature and DSM-III-R PD criteria and associated features, while the updated 2002 set of hypothesised PD-FFM facet trait relationships are based on DSM-IV-TR PD criteria. The articulated trait constellations in these PD-FFM facet trait profiles are hypothesised to underlie the relevant PD category and the profiles are descriptive of the prototypic case (Widiger et al. 2002b). Alternative sets of hypothesised PD-FFM facet trait relationships have also been proposed, such as those based on a combination of DSM-III-R/DSM-IV-TR criteria (Trull and Widiger 1997) or on either the opinions of academic experts (Lynam and Widiger 2001) or on clinicians' experience (Samuel and Widiger 2004). The present research focused on the hypothesised PD-FFM facet trait directional relationships for DSM-IV-TR PDs proposed by Widiger et al. (2002b), which are displayed in Table 1.

In comparison to the vast number of studies that have investigated the relationships between PDs and FFM domains (e.g., Bagby et al. 2005b, 2008; Madsen et al. 2006), there have been fewer studies that have explored the relationships between PDs and FFM facets. While some of these studies have investigated PD-FFM facet trait relationships for all DSM-IV-TR PDs, most studies however have examined such relationships for only specific PDs (e.g., Morey et al. 2002; Quirk et al. 2003) or have used only a subset of the 30 FFM facets (e.g., Miller et al. 2005). Examination of the published studies that investigated PD-FFM facet trait relationships for

Table 1 Hypothesised Directional Relationships between DSM-IV-TR PDs and FFM Facet Traits

FFM Traits	PAR	SZD	SZT	ATS	BDL	HST	NAR	AVD	DEP	OBC
Neuroticism										
Anxiety			+		+			+	+	
Angry Hostility	+			+	+		+			
Depression					+	+		+		
Self-Consciousness			+			+	+	+	+	
Impulsiveness					+					
Vulnerability					+			+	+	
Extraversion										
Warmth		–	–			+			+	
Gregariousness		–	–			+		–		
Assertiveness								–	–	+
Activity										
Excitement-Seeking				+		+		–		
Positive Emotions		–	–			+				
Openness										
Fantasy			+			+	+			
Aesthetics										
Feelings		–				+				
Actions			+							
Ideas			+							
Values										–
Agreeableness										
Trust	–		–		–	+			+	
Straightforwardness	–			–						
Altruism				–			–		+	
Compliance	–			–	–				+	–
Modesty							–		+	
Tender-Mindedness				–			–			
Conscientiousness										
Competence					–					+
Order										+
Dutifulness				–						+
Achievement Striving							+			+
Self-Discipline				–						
Deliberation				–						

Note. PAR paranoid PD, SZD schizoid PD, SZT schizotypal PD, ATS Antisocial PD, BDL borderline PD, HST histrionic PD, NAR narcissistic PD, AVD avoidant PD, DEP dependent PD, OBC obsessive-compulsive PD. + indicates a hypothesised positive relationship; while – indicates a hypothesised negative relationship. Hypothesised directional relationships are based on the PD-FFM facet trait profiles proposed by Widiger et al. (2002b).

the DSM-IV-TR PD categories using all 30 FFM facets highlight two main overall findings. First, studies that utilised correlation analyses generally confirmed most of the hypothesised PD-FFM facet trait relationships that were explored irrespective of the type of sample that was employed, that is, clinical (e.g., Mullins-Sweatt and Widiger 2007b; Yang et al. 2002) or non-clinical usually student (e.g., Dyce and O'Connor 1998; Mullins-Sweatt and Widiger 2007a). This is

consistent with the dimensional approach to understanding PDs. Second, the studies that utilised regression analyses found that selected subsets FFM facet traits explained generally a moderate amount of the variance in all PD categories (e.g., Aluja et al. 2007; Trull et al. 2001). However, most of these studies entered a priori selected subsets of FFM facets as predictor variables in their regression equations (e.g., Bagby et al. 2005a; De Fruyt et al. 2006; Huprich 2003; Reynolds and

Clark 2001; Thimm 2011). Thus, a valid question to be asked is whether the possible range of PD-FFM facet predictive relationships has been adequately explored in previous research.

To clarify the relationships between PDs and FFM facets, Samuel and Widiger (2008) performed a meta-analysis using data from 16 published and unpublished studies. Results largely corresponded with the hypothesised PD-FFM facet profiles proposed by Widiger et al. (2002b), however there were several exceptions. The most notable exceptions pertained to specific hypothesised PD-FFM facet directional relationships for schizotypal, histrionic, dependent and obsessive-compulsive PDs which were not confirmed. For example, contrary to the Widiger et al. (2002b) hypothesised PD-FFM facet trait profiles for these PDs (see Table 1), schizotypal PD did not correlate with Actions, histrionic PD did not correlate with Depression, dependent PD did not correlate with Altruism, and obsessive-compulsive PD did not correlate with Assertiveness. Further, Openness facets had little relationship with any PD. Notwithstanding the unconfirmed relationships described above, all PDs displayed unique and meaningful relationships with FFM facets. The weighted mean effect size correlations for all PD-FFM facet trait relationships were mostly below $r=0.35$, hence in the small to medium effect size range (Cohen 1988), and were moderated by the PD or FFM instrument that was used. Thus, Samuel and Widiger recommended that future research examine PD-FFM facet relations using alternative instruments so as to provide further evidence of the validity in describing and conceptualising PDs as constellations of specific FFM traits.

The Present Study

The major aim of the present study was to examine the relationships between higher- and lower-order FFM traits, as measured by the NEO-PI-R, and PD features as measured by the Wisconsin Personality Disorders Inventory-IV (WISPI-IV; Klein and Benjamin 1996; Klein et al. 1993). The current study was guided by two research questions. First, are there theoretically-meaningful relationships between PD features as measured by the WISPI-IV and FFM traits as measured by the NEO-PI-R? Secondly, can combinations of lower-order FFM facet traits account for variance in the prediction of PD features? Research reviewed above highlighted that specific FFM traits are correlates of particular PD syndromes. However, of the published studies that have examined the relationships between PDs and FFM traits, to date only three have used the WISPI-IV as the measure of PD features. Gore et al. (2011) explored only the relationships between the WISPI-IV's histrionic PD scale and the FFM domains. The remaining two studies focused solely on the WISPI-IV's obsessive-compulsive PD scale and its relationships with either only

Conscientiousness facets (Samuel and Widiger 2011) or all FFM domains and facets (Samuel and Widiger 2010). The lack of published research using the WISPI-IV is surprising considering that this instrument has been shown to have generally superior psychometric properties in comparison to most other self-report measures of PDs (Clark and Harrison 2001). Since the meta-analysis by Samuel and Widiger (2008) suggested that some relationships between specific FFM facets and PD features could be instrument-specific, it is essential to clarify how FFM facets relate to this measure of PDs. Indeed, Samuel and Widiger expressed that a clear implication of their meta-analysis was the need for further research using different measures of PDs and the FFM so as to better understand hypothesised PD-FFM relationships. Hence, the present study specifically investigated the validity of Widiger and colleagues' (2002b) hypothesised PD-FFM facet relationships, using the WISPI-IV as the measure of PD features, in an Australian non-clinical analogue sample. In light of Samuel and Widiger's suggestion, the current research was exploratory in nature because the WISPI-IV has been under-utilised as a measure in examining the relationships between PD features and FFM facet traits.

In line with the findings of Saulsman and Page (2004), it was hypothesised that most PDs would obtain positive correlations with Neuroticism and negative correlations with Agreeableness, while Extraversion, Openness and Conscientiousness would obtain differential correlations depending on the PD features in question. Furthermore, on the basis of previous research (e.g., Aluja et al. 2007; De Clercq and De Fruyt 2003; Dyce and O'Connor 1998; Mullins-Sweatt and Widiger 2007a; Yang et al. 2002), it was predicted that greater than 50 % of the specific PD-FFM facet relationships hypothesised by Widiger et al. (2002b) would be confirmed using the WISPI-IV (see Table 1 in the current study). Also, on the basis of previous work (e.g., Bagby et al. 2005a; De Fruyt et al. 2006; Huprich 2003; Reynolds and Clark 2001; Trull et al. 2001) it was expected that FFM facets would account for statistically significant amounts of variance in all PD features.

Method

Participants

Participants were recruited simultaneously from both an urban university in Melbourne and from the general population through the use of flyers, email invitations and word-of-mouth recruitment so as to obtain a larger and more diverse sample. The only exclusion criterion was that participants were required to be aged over 18 years. In total, 316 individuals aged over 18 years participated in this study. However,

three participants did not return their questionnaire packs. Thus, the final sample consisted of 313 participants ($M=26.50$ years, $SD=10.10$, age range = 18–72 years), with 114 men ($M=28.73$ years, $SD=11.83$, age range = 18–72 years) and 199 women ($M=25.23$ years, $SD=8.74$, age range = 18–58 years). Overall, the participants had completed an average of 14.91 years of formal education ($SD=1.94$). Table 2 contains a breakdown of other characteristics of the sample.

Materials

This study formed part of a larger program of research about PDs that involved multiple personality measures. Only the measures relevant to this study are reported. Along with an information letter and consent forms, participants were given a questionnaire pack that contained sociodemographic questions and the measures. To minimise any potential practice, order or fatigue effects, the measures were counterbalanced and each participant received one of three predetermined versions of the questionnaire pack.

Table 2 Sample Characteristics

Characteristic	<i>n</i>	%
Currently attending university		
Yes	236	75.4 %
No	77	24.6 %
Ethnic or cultural background		
Australian or New Zealander	184	58.8 %
Asian	66	21.1 %
European	28	8.9 %
Middle Eastern	25	8.0 %
South American	6	1.9 %
African	3	1.0 %
North American	1	0.3 %
Employment status		
Full-time student	102	32.6 %
Full-time student & employed	98	31.3 %
Employed full-time	60	19.2 %
Part-time student & employed	28	8.9 %
Part-time student	8	2.6 %
Employed part-time	8	2.6 %
Not employed	7	2.2 %
Other	2	0.6 %
Relationship status		
Single	146	46.7 %
Attached	109	34.8 %
Married	56	17.9 %
Other	2	0.6 %

Note. $N=313$.

Sociodemographic Questions In order to establish some basic information about the characteristics of the sample, participants were asked to respond to questions about their age in years, their gender, whether or not they were a university student, their ethnic or cultural background, the number of years of formal education they had completed, their employment status and their relationship status.

PD Features PD features were measured by the Wisconsin Personality Disorders Inventory-IV (WISPI-IV; Klein and Benjamin 1996; Klein et al. 1993), which is a 214-item self-report inventory from which scores on 11 PD scales can be obtained, that is, the 10 DSM-IV-TR PDs and passive-aggressive PD. Except for the passive-aggressive PD scale, which is based on DSM-III-R criteria, all WISPI-IV PD scales correspond to DSM-IV-TR PD criteria and each criterion is assessed by at least two items. The WISPI-IV items have an interpersonal focus and are worded from the phenomenological perspective of the respondent in that they describe the PD-related features, behaviours, symptomology and experiences that are likely to be endorsed by an individual with a specific PD (Klein et al. 1993).

The WISPI-IV requires respondents to rate their “usual self during the past five years or more” with items rated on a 10-point Likert-type scale ranging from 1 (*never or not at all*) to 10 (*always or extremely*). Scores for each PD scale are summed and averaged to obtain mean scale scores. Higher scores on the PD scales indicate greater endorsement of features, behaviours and symptoms that are consistent with the corresponding PD syndrome (Klein et al. 1993). Smith, Klein, and Benjamin (2003) reported that alpha coefficients for the WISPI-IV PD scales averaged $\alpha=0.84$ and ranged from $\alpha=0.74$ (antisocial PD) to $\alpha=0.91$ (avoidant PD) in a sample of 75 psychiatric inpatients.

FFM of Personality Traits The NEO Personality Inventory-Revised (NEO-PI-R; Costa and McCrae 1992) was used to measure FFM personality traits. The NEO-PI-R is a 240-item self-report inventory that provides scores for the five major domains of personality, as well scores for the six facet traits that define each domain. Items are rated on a 5-point Likert-type scale ranging from 0 (*strongly disagree*) to 4 (*strongly agree*) and each facet scale is assessed by eight items. Facet raw scores are obtained by summing scores on the items that comprise the facet scale. Domain raw scores are obtained by summing the six facet scale scores that comprise relevant domain. Raw scores for all scales are then converted into *T* scores which have a mean of 50 and a standard deviation of 10 (Costa and McCrae 1992). Higher *T* scores indicate higher levels of a specific personality trait.

The NEO-PI-R is the standard and most widely used measure of the FFM and reliability and validity studies have consistently demonstrated its good psychometric properties

(Costa and McCrae 1992; Piedmont 1998). Internal consistency alpha coefficients reported by Costa and McCrae (1992) ranged from $\alpha = 0.86$ (Agreeableness) to $\alpha = 0.92$ (Neuroticism) for the five domains and from $\alpha = 0.56$ (Tender-Mindedness) to $\alpha = 0.81$ (Depression) for the 30 facets in a large ($N = 1,539$) non-clinical sample.

Procedure

Approval to conduct this study was obtained from the University's Human Research Ethics Committee. Each university student who contacted the researcher by email to express interest in participating in the study was sent a response email inviting him or her to attend a testing session. Most testing sessions involved small groups of participants; however, some participants attended individual testing sessions. All testing sessions were held in a quiet room at the university. At each testing session the researcher provided participants with an information letter and consent forms to read, plus a verbal description of the general aims of the study. After providing written consent, each participant was given a questionnaire pack to complete. The researcher provided participants with instructions on how to complete the measures inside the pack. Typically, the researcher remained in the room with the participants for the duration of the testing session so as to answer any questions. Each testing session lasted approximately 60 to 120 min and participants were encouraged to take short breaks as required. University students received minor course credit for their voluntary participation in this study. The participants that were recruited from the general population were provided with questionnaire packs to complete in their own time and return to the researcher in sealed envelopes.

Results

Descriptive Statistics

Means, standard deviations, score ranges and Cronbach's alpha internal consistency coefficients for each WISPI-IV PD scale are presented in Table 3. As displayed in this table, the WISPI-IV PD scales evidenced good internal consistency, with Cronbach's alpha coefficients all above $\alpha = 0.80$. Furthermore, whilst participants' mean scores on the PD scales were generally low, inspection of the normative z scores revealed that participants' scores were nonetheless similar to those of the non-patients in the WISPI-IV normative validation sample (Klein and Benjamin 1996; Klein et al. 1993).

Table 4 displays the descriptive statistics for the NEO-PI-R trait scales. This table shows that participants' mean T scores for the majority of the NEO-PI-R scales were within the

Average range of 45–55 (Costa and McCrae 1992). The FFM domain scales evidenced excellent internal consistency, with Cronbach's alpha coefficients all above $\alpha = 0.87$. The 30 lower-order facet scales obtained lower alpha coefficients, yet the majority of these were still above $\alpha = 0.60$ which some consider to be the lower limit value for acceptable internal consistency (Hair et al. 2010). However, applying the lower limit value of $\alpha = 0.60$ meant that the facet scales of Activity ($\alpha = 0.57$), Actions ($\alpha = 0.56$) and Tender-Mindedness ($\alpha = 0.44$) evidenced poor internal consistency. Costa and McCrae (1992) reported somewhat similar alpha coefficients of $\alpha = 0.63$ for Activity, $\alpha = 0.58$ for Actions and $\alpha = 0.56$ for Tender-Mindedness and argued that such alpha coefficients were acceptable given that only eight items comprised each facet scale. Since a large body of research has demonstrated that the NEO-PI-R has good psychometric properties (Costa and McCrae 1992), these scales were retained and used in the analyses with the caveat that any results obtained using the Tender-Mindedness scale in particular should be interpreted with caution. It should also be noted that these scales were used for research and not clinical decision-making purposes.

Correlational Analyses

Pearson's correlations were performed to examine the relationships between PD features as measured by the WISPI-IV PD scales and FFM higher- and lower-order traits as measured by the NEO-PI-R. The results of these analyses are presented in Table 5. A conservative alpha level of $p \leq 0.001$ was used to determine statistical significance and all analyses were sufficiently powered to detect even weak r s.

Broadly speaking, most WISPI-IV PD scales were positively correlated with Neuroticism and negatively correlated with Extraversion, Agreeableness and Conscientiousness. A noteworthy exception to this pattern was a positive correlation between Extraversion and the histrionic PD scale, indicating that a higher level of Extraversion is associated with histrionic PD features. The only WISPI-IV PD scales that were correlated with Openness at the $p \leq 0.001$ level were the schizoid and antisocial PD scales and both relationships were negative in nature, indicating that a lower level of Openness is associated with schizoid and antisocial PD features.

When Table 5 is viewed across each row the specific statistically significant FFM domain-level profile for each PD scale can be ascertained. The paranoid, narcissistic and obsessive-compulsive PD scales were characterised by positive correlations with Neuroticism and negative correlations with Agreeableness. Similarly, the antisocial PD scale was positively correlated with Neuroticism and moderately negatively correlated with Agreeableness, yet was also characterised by negative correlations with Conscientiousness and Openness. The histrionic PD scale was characterised by

Table 3 Descriptive Statistics and Reliability of the WISPI-IV Scales

WISPI-IV PD Scale	<i>M</i>	<i>SD</i>	Range	Normative <i>z</i> score ^a	Cronbach's α
Paranoid PD	3.10	1.34	1–8.53	0.01	0.87
Schizoid PD	2.47	1.06	1–8.67	−0.25	0.82
Schizotypal PD	2.15	1.12	1–8.05	−0.10	0.91
Histrionic PD	3.18	1.28	1–8.28	0.16	0.89
Narcissistic PD	2.85	1.30	1–9.47	−0.18	0.90
Antisocial PD	1.53	0.66	1–4.81	−0.33	0.88
Borderline PD	2.45	1.15	1–7.67	−0.29	0.88
Avoidant PD	3.08	1.54	1–8.50	−0.14	0.92
Dependent PD	2.35	1.19	1–7.11	−0.39	0.91
Obsessive-Compulsive PD	3.48	1.21	1–7.47	0.10	0.85
Passive-Aggressive PD	2.97	1.21	1–6.68	0.25	0.88

Note. ^a Normative *z* scores compare the participants' mean scores with the means of the U.S. non-patients from the WISPI-IV normative validation sample (Klein and Benjamin 1996; Klein et al. 1993).

negative correlations with Agreeableness and Conscientiousness and a positive correlation with Extraversion. Conversely, the schizoid PD scale was characterised by negative correlations with Extraversion, Openness and Agreeableness. The borderline and avoidant PD scales evidenced a similar pattern of correlations in that both scales were strongly positively correlated with Neuroticism and negatively correlated with Agreeableness and Conscientiousness. However, the avoidant PD scale was also characterised by a moderate negative correlation with Extraversion. Likewise, the dependent and passive-aggressive PD scales also showed a similar pattern of correlations in that both were moderately positively correlated with Neuroticism and negatively correlated with Extraversion, Agreeableness and Conscientiousness. However, the passive-aggressive PD scale obtained a stronger negative correlation with Agreeableness than did the dependent PD scale. Lastly, the schizotypal PD scale was characterised by a positive correlation with Neuroticism and negative correlations with Extraversion and Agreeableness.

Statistically significant correlations were also obtained at the facet level. If Table 5 is viewed down each column the unique FFM facet trait profiles of each WISPI-IV PD scale can be determined. Both negative and positive PD-FFM facet trait correlations were obtained and the magnitude of these correlations ranged between weak ($r < 0.30$) to strong ($r > 0.50$), with most correlations falling in the moderate range. The table shows that the PD-FFM facet profiles for most WISPI-IV PD scales were generally consistent with those hypothesised by Widiger et al. (2002b). In fact, 44 out of 73 or 60 % of the Widiger et al. hypothesised PD-FFM facet predictions were statistically significant and a further seven predicted relationships would have been confirmed if a less stringent alpha level was used (see the last row of Table 5). Thus, the expectation that greater than 50 % of the hypothesised PD-FFM facet trait relationships put forth by Widiger et al. would be confirmed in

this study was indeed supported. However, as indicated in the table, poor support was found for several predicted PD-FFM facet trait relationships concerning the schizotypal, histrionic, dependent and obsessive-compulsive PD scales. For example, Widiger et al. hypothesised a positive correlation between schizotypal PD and the FFM facet of Ideas. However, as shown in Table 5 this was not confirmed in the current study ($r = 0.01$). The issue of non-significant correlations is elaborated in the Discussion.

Furthermore, inspection of Table 5 reveals several statistically significant and meaningful PD-FFM facet correlations that were not hypothesised by Widiger et al. (2002b). Some examples include a negative correlation between Values and the paranoid PD scale, a positive correlation between Depression and the antisocial PD scale and a negative correlation between Straightforwardness and the histrionic PD scale.

Regression Analyses

In order to investigate whether FFM facets could account for variance in PD features and to determine the most salient predictors of PD features, a series of multiple regression analyses were performed. In each analysis, a specific WISPI-IV PD scale was entered as the criterion variable and selected subsets of FFM facets were entered as predictor variables contingent on their statistical significance as correlates of the PD scales from the correlational analyses. That is, in each multiple regression analysis, the FFM facets that were statistically significantly ($p \leq 0.001$) correlated with the given PD scale (see Table 5) were simultaneously entered as a class of predictor variables in order to independently assess their relationship with that PD syndrome. FFM facets rather than domains were entered as predictor variables because the facets are said to provide a finer description and differentiation of the

Table 4 Descriptive Statistics and Reliability of the NEO-PI-R Scales

NEO-PI-R Scale	<i>M</i>	<i>SD</i>	Range	Cronbach's α
Neuroticism	55.73	11.20	25–80	0.93
Anxiety	54.90	10.24	29–80	0.78
Angry Hostility	52.82	10.49	27–80	0.73
Depression	55.03	10.99	32–80	0.84
Self-Consciousness	54.46	11.17	23–80	0.72
Impulsiveness	53.59	10.72	25–80	0.68
Vulnerability	54.79	11.63	23–80	0.79
Extraversion	54.39	10.50	21–80	0.88
Warmth	51.15	10.39	20–74	0.73
Gregariousness	54.50	10.95	20–80	0.75
Assertiveness	50.38	10.93	20–78	0.77
Activity	49.96	9.37	23–75	0.57
Excitement-Seeking	56.82	9.92	29–80	0.64
Positive Emotions	54.55	10.65	23–79	0.75
Openness	56.00	10.98	27–80	0.88
Fantasy	56.85	11.18	28–80	0.79
Aesthetics	53.40	10.70	25–78	0.78
Feelings	54.70	11.63	20–80	0.74
Actions	49.16	10.16	28–80	0.56
Ideas	54.24	10.86	22–78	0.80
Values	54.00	10.10	20–75	0.67
Agreeableness	47.27	11.48	20–77	0.87
Trust	47.18	11.21	20–76	0.79
Straightforwardness	46.66	11.42	20–73	0.73
Altruism	51.37	11.21	20–76	0.73
Compliance	46.69	11.88	20–80	0.68
Modesty	48.81	11.28	20–77	0.72
Tender-Mindedness	50.96	10.01	20–79	0.44
Conscientiousness	45.35	12.29	20–76	0.92
Competence	46.28	11.61	20–76	0.68
Order	46.62	11.51	20–76	0.70
Dutifulness	46.17	11.62	20–71	0.67
Achievement Striving	47.65	12.07	20–74	0.75
Self-Discipline	42.35	12.67	20–73	0.83
Deliberation	50.69	11.40	21–78	0.73

PDs (Widiger et al. 2002b). Moreover, since the correlational analyses in Table 5 revealed statistically significant and meaningful PD-FFM facet relationships that Widiger et al. (2002b) did not hypothesise, all facets that were statistically significantly correlated with the given PD scale were entered as predictors, in contrast to just those hypothesised by Widiger et al. in their PD-FFM facet trait profiles. Entering all significant correlates of the relevant PD was done so as to ensure that potential predictive relationships were not overlooked. This resulted in between 8 (schizoid PD) and 24 (passive-aggressive PD) facet predictor variables that were entered in each regression analysis. The

summary statistics of the multiple regression analyses are presented in Table 6.

As shown in Table 6, combinations of lower-order FFM facets significantly accounted for variance in PD features as measured by each WISPI-IV PD scale, with R^2 values ranging from 0.18 (obsessive-compulsive PD features) to 0.49 (avoidant PD features). The table also reveals that each PD scale was associated with a unique combination of statistically significant FFM facet predictors in order of magnitude and direction of relationship. For example, the paranoid PD scale was predicted by low Values, low Straightforwardness, low Trust, and high Self-Consciousness; whereas the dependent PD scale was predicted by high Vulnerability, low Values, high Depression, low Self-Discipline and low Straightforwardness. A notable finding across the regression analyses shown in Table 6 was that Values emerged as a significant negative predictor of 7 out of 11 PDs. In the Discussion, the importance of the findings about Values is further addressed.

Discussion

The major aim of the present study was to examine the relationships between higher- and lower-order FFM traits and PD features. Two key research questions were posed and the results will be discussed in relation to these research questions.

Are There Theoretically-Meaningful Relationships between PD Features and FFM Traits?

Consistent with previous studies that have used other instruments to measure PDs (Bagby et al. 2005b, 2008; Costa and Widiger 2002; Samuel and Widiger 2008; Saulsman and Page 2004), correlational analyses in the current study revealed that four personality domains from the FFM were associated with the majority of WISPI-IV PD scales. In general, Neuroticism was positively correlated with most PD scales while Extraversion, Agreeableness and Conscientiousness were negatively correlated. The sole exception to this pattern was a positive correlation between Extraversion and the histrionic PD scale, which accords with previous work (Saulsman and Page 2004). These findings indicate that, in general, the high pole of Neuroticism and the low poles of Extraversion, Agreeableness and Conscientiousness are associated with the personality pathology features, symptomology and behaviours that comprise the DSM-IV-TR PD criteria as measured in the present research by the WISPI-IV PD scales. Furthermore, in contrast to other FFM domains, Neuroticism and Agreeableness, plus their respective facets, obtained relatively stronger correlations with most PD scales. Again, this is consistent with previous research (Madsen et al. 2006; Saulsman and Page

Table 5 Correlations between FFM Personality Traits and PD Features

	Paranoid PD	Schizoid PD	Schizotypal PD	Histrionic PD	Narcissistic PD	Antisocial PD	Borderline PD	Avoidant PD	Dependent PD	Obsessive- Compulsive PD	Passive Aggressive PD
FFM Traits											
Neuroticism	.29***	.13*	.29***	.15*	.25***	.22***	.55***	.58***	.46***	.28***	.39***
Anxiety	.20***	.03	.19***	.06	.17**	.10	.39***	.42***	.31***	.21***	.23***
Angry Hostility	.34***	.14*	.24***	.15**	.27***	.17**	.40***	.34***	.26***	.23***	.33***
Depression	.29***	.22***	.32***	.12*	.23***	.24***	.55***	.58***	.45***	.27***	.35***
Self-Consciousness	.27***	.18**	.25***	.07	.24***	.18**	.40***	.59***	.39***	.28***	.33***
Impulsiveness	.14*	.04	.17**	.24***	.19***	.12*	.38***	.27***	.23***	.15**	.29***
Vulnerability	.17**	.09	.23***	.09	.15**	.21***	.48***	.49***	.50***	.21***	.30***
Extraversion	-.13*	-.33***	-.19***	.23***	-.08	-.11*	-.18**	-.42***	-.21***	-.11	-.20***
Warmth	-.26***	-.35***	-.25***	.05	-.19***	-.27***	-.22***	-.33***	-.20***	-.17**	-.24***
Gregariousness	-.20***	-.39***	-.23***	.10	-.18***	-.08	-.18***	-.40***	-.15**	-.22***	-.20***
Assertiveness	-.01	-.12*	-.04	.21***	.03	-.01	-.14*	-.35***	-.22***	.02	-.12*
Activity	.06	-.06	-.02	.16**	.01	-.02	-.10	-.25***	-.17**	.05	-.18***
Excitement-Seeking	.01	-.16**	-.06	.27***	.06	.03	.08	-.10	.04	.00	.06
Positive Emotions	-.17**	-.26***	-.17**	.13*	-.09	-.16**	-.20***	-.31***	-.20***	-.13*	-.18***
Openness	-.12*	-.24***	-.04	.02	-.06	-.19***	.04	-.02	-.11	-.10	-.10
Fantasy	.01	-.09	.07	.17**	.07	-.02	.17**	.17**	.13*	-.03	.09
Aesthetics	.02	-.10	.12*	.04	.03	-.04	.11	.07	.03	.00	-.00
Feelings	-.06	-.18***	-.05	-.01	-.05	-.18***	.04	.03	-.07	-.05	-.07
Actions	-.18**	-.22***	-.15**	-.01	-.15**	-.15**	-.08	-.24***	-.19***	-.22***	-.20***
Ideas	-.04	-.13*	.01	.02	.03	-.14*	-.04	-.05	-.14*	.03	-.07
Values	-.32***	-.31***	-.26***	-.17**	-.28***	-.27***	-.13*	-.15**	-.27***	-.23***	-.22***
Agreeableness	-.41***	-.21***	-.36***	-.31***	-.41***	-.43***	-.37***	-.21***	-.20***	-.26***	-.38***
Trust	-.42***	-.31***	-.32***	.14*	-.31***	-.29***	.30***	-.32***	.22***	-.27***	-.31***
Straightforwardness	-.31***	-.13*	-.28***	-.31***	-.29***	-.35***	.30***	-.16**	-.20***	-.18**	-.30***
Altruism	-.22***	-.21***	-.25***	-.06	-.21***	-.34***	-.26***	-.23***	-.19***	-.14*	-.32***
Compliance	-.26***	-.06	-.14*	-.17**	-.24***	-.20***	-.20***	-.04	.01	-.13*	-.19***
Modesty	-.17**	-.03	-.20***	-.33***	-.34***	-.26***	-.10	.06	-.03	-.18**	-.19***
Tender-Mindedness	-.18***	-.12*	-.22***	-.20***	-.22***	-.30***	-.27***	-.14*	-.17**	-.15**	-.20***
Conscientiousness	-.09	-.11	-.18**	-.19***	-.11	-.23***	-.44***	-.34***	-.39***	-.02	-.41***
Competence	-.13*	-.17**	-.20***	-.12*	-.14*	-.23***	.38***	-.34***	-.40***	-.09	-.35***
Order	-.01	-.05	-.07	-.14*	-.03	-.11	.29***	-.20***	-.21***	.01	-.29***
Dutifulness	-.03	-.03	-.17**	-.14*	-.05	-.25***	-.29***	-.19***	-.29***	.06	-.30***
Achievement Striving	-.05	-.10	-.08	-.04	-.02	-.12*	-.29***	-.31***	-.27***	.06	-.26***
Self-Discipline	-.13*	-.12*	-.20***	-.21***	-.17**	-.22***	-.46***	-.40***	-.41***	-.15**	-.46***
Deliberation	-.04	-.05	-.08	-.19***	-.03	-.16**	-.28***	-.13*	-.22***	.09	-.23***
Significant predictions ^a	4/4	4/4	5/9	1/9	5/7	6/9	8/8	6/7	4/9	1/7	—
Significant at lower p^b	4/4	4/4	6/9	4/9	5/7	8/9	8/8	6/7	4/9	2/7	—
Significant not predicted ^c	8	5	10	7	8	8	12	13	13	8	—

Note. ^a PD-FFM facet trait predictions based on the hypothesised PD-FFM facet trait profiles proposed by Widiger et al. (2002b) that were statistically significant at $p \leq 0.001$ level.

Irrespective of statistical significance in the current study, the Widiger et al. (2002b) correlations predicted to be positive are shaded, whereas the correlations predicted to be negative are underlined.

^b PD-FFM facet trait predictions based on the hypothesised PD-FFM facet trait profiles put forth by Widiger et al. (2002b) that would have been statistically significant if a less conservative alpha level had been used.

^c PD-FFM facet trait correlations that were statistically significant at $p \leq 0.001$ level, as indicated by the asterisk, but which were not predicted in the profiles by Widiger et al. (2002b).

* $p \leq 0.05$. ** $p \leq 0.01$. *** $p \leq 0.001$.

Table 6 Multiple Regression Results Predicting PD Features

PD Features	<i>df</i>	<i>F</i>	<i>R</i> ²	Significant Trait Predictors
Paranoid	12, 300	10.91***	0.30	Values (---), Straightforwardness (--), Trust (-), Self-Consciousness (+)
Schizoid	9, 303	12.24***	0.27	Values (---), Gregariousness (---)
Schizotypal	15, 297	7.52***	0.28	Depression (++), Values (---), Modesty (---)
Histrionic	8, 304	12.46***	0.25	Modesty (---), Excitement-Seeking (++), Self-Discipline (-), Straightforwardness (-), Assertiveness (+)
Narcissistic	13, 299	10.40***	0.31	Modesty (---), Values (---), Self-Consciousness (+)
Antisocial	14, 298	8.58***	0.29	Modesty (---), Depression (+), Values (-), Straightforwardness (-)
Borderline	20, 291	11.88***	0.45	Depression (+++), Straightforwardness (--), Tender-Mindedness (-)
Avoidant	19, 293	14.80***	0.49	Self-Consciousness (+++), Depression (++), Gregariousness (-)
Dependent	20, 292	9.57***	0.40	Vulnerability (+++), Values (---), Depression (++), Self-Discipline (-), Straightforwardness (-)
Obsessive-Compulsive	9, 303	7.18***	0.18	Values (---), Self-Consciousness (+)
Passive-Aggressive	24, 288	8.06***	0.40	Self-Discipline (---), Modesty (---), Values (---), Order (-)

Note. The statistically significant FFM facet predictors of each PD are listed in order of magnitude, as indicated by the number of - or + signs, which indicate whether the predictive relationship is negative or positive in direction.

*** $p \leq .001$

2004) and indicates that traits that are associated with emotional maladjustment and interpersonal antagonism may be common to most PD syndromes. However, it is important to point out that high or low trait scores do not by default translate into a PD and clinicians must follow further steps to ascertain whether or not an individual has a PD diagnosis (Widiger and Mullins-Sweatt 2009).

Openness did not obtain prominent correlations with the PD scales. However, Openness did obtain statistically significant, though weak, negative correlations with schizoid and antisocial PD scales, suggesting that the closed-mindedness that is characteristic of the low pole of this broad personality domain may be relevant to a small number of specific PDs. Previous literature has suggested that the Openness domain has no salient relationships with PDs (Saulsman and Page 2004). However, some Openness facets such as Values may indeed have key relationships with PDs that have not been fully explored in previous research. These relationships will be discussed later.

The correlational analyses also revealed unique relationships between the WISPI-IV PD scales and the FFM lower-order facets, which provide a more nuanced description of and better discrimination between the PD scales than do the higher-order personality domains. As expected, more than 50 % of the Widiger et al. (2002b) hypothesised PD-FFM

facet relationships were confirmed using the WISPI-IV as a measure of PD features. In fact, the results revealed that 60 % of these hypothesised relationships were confirmed, indicating the PD-FFM facet correlations in this study were largely consistent with the hypotheses proposed by Widiger et al. The high percentage of confirmed correlations compares favourably to those that have been obtained by previous researchers using other PD measures (e.g., De Fruyt et al. 2006). The implication is that most PD syndromes as measured by the WISPI-IV can be understood and differentiated in terms of combinations of specific traits from the FFM.

While most PD-FFM facet profiles were consistent with those proposed by Widiger et al. (2002b), the results did not confirm several key hypothesised relationships, most notably for schizotypal, histrionic, obsessive-compulsive and dependent PDs. For example, the schizotypal PD scale did not obtain statistically significant correlations with the Openness facets of Fantasy, Actions and Ideas as predicted. Although the histrionic PD scale was significantly positively correlated with Extraversion, it did not obtain the expected statistically significant positive correlations with the Extraversion facets of Warmth, Gregariousness or Positive Emotions. Contrary to predictions by Widiger et al., the obsessive-compulsive PD scale evidenced no statistically significant positive correlations with Conscientiousness or its facets. Finally, although

the dependent PD scale had statistically significant negative correlations with Agreeableness and some of its facets, these correlations were in the opposite direction to that which was hypothesised by Widiger et al. These findings, however, are not unique to this study as several other studies have failed to obtain support for the Widiger et al. hypothesised PD-FFM facet relationships for some or all four of these PDs using alternative PD measures (e.g., Aluja et al. 2007; Bagby et al. 2005a, b, 2008; De Clercq and De Fruyt 2003; De Fruyt et al. 2006; Dyce and O'Connor 1998; Huprich 2003; Mullins-Sweatt and Widiger 2007a; Samuel and Widiger 2008; Trull et al. 2001; Yang et al. 2002).

There could be several explanations for the lack of relationships between these PD scales and FFM facets. First, the results could be instrument-specific since there is no gold standard measure of PDs (Clark and Harrison 2001). Indeed, in their meta-analysis, Samuel and Widiger (2008) found that PD-FFM facet relationships differed depending on the type of PD measure that was used. For example, they found that studies that used the MCMI-III (Millon et al. 1997) or the SNAP (Clark 1993a) to measure obsessive-compulsive PD obtained moderate to strong positive correlations between obsessive-compulsive PD and Conscientiousness facets. In contrast, studies that used the PDQ-4 (Hyler 1994) and its predecessors or the SCID-II (First et al. 1997) to measure this PD obtained negligible or extremely weak correlations between obsessive-compulsive PD and Conscientiousness facets. Importantly, the WISPI-IV PD scales have been shown to have better convergence with the PDQ-4 and SCID-II PD scales compared to MCMI PD scales (Klein et al. 1993; Smith et al. 2003). Thus, the very weak relationships between the WISPI-IV obsessive-compulsive PD scale and Conscientiousness facets that were obtained in this study are not surprising if viewed in the context of reported research. A related issue is that the FFM as operationalised in the NEO-PI-R disproportionately emphasises adaptive or desirable rather than maladaptive expressions of Agreeableness, Extraversion, Conscientiousness and Openness at the high end poles (Haigler and Widiger 2001). If there is insufficient coverage of maladaptive personality functioning in the NEO-PI-R, then weak or negative correlations between the high poles of these domains and specific PD features could be expected (Gore et al. 2011). A direction for future studies is for researchers to consider using the DSM-5's more recent empirically derived model of maladaptive personality traits (see Krueger and Markon 2014 for a review) alongside the NEO-PI-R enabling comparisons between the two.

Samuel and Widiger (2010, 2011) found weak positive correlations between the WISPI-IV obsessive-compulsive PD scale and Conscientiousness and its facets of Order, Dutifulness and Deliberation. However, these findings were not supported by the results of the current study. One explanation for the contradictory findings could be differences in sampling. Specifically, Samuel and Widiger's studies employed a

much larger sample ($N=536$) and they oversampled for obsessive-compulsive PD symptomology. Hence, it is possible their studies captured more variance in obsessive-compulsive PD features in comparison to the current study. Therefore they were better placed to test the theoretical connection between Conscientiousness and obsessive-compulsive PD features.

However, as mentioned in the Results section with accompanying examples, the correlational analyses in the current study did reveal several PD-FFM facet relationships that Widiger et al. (2002b) did not predict (cf., Lynam and Widiger 2001; Samuel and Widiger 2004). Thus, another explanation for the lack of confirmed relationships between specific FFM facets and corresponding schizotypal, histrionic, obsessive-compulsive and dependent PD scales is that the hypothesised PD-FFM facet profiles for these PDs proposed by Widiger et al. could be better defined by other FFM facets (Huprich 2003). For instance, since the obsessive-compulsive PD scale in the current study was positively correlated with Neuroticism and most of its facets a plausible explanation is that some of the features that comprise this PD syndrome may be more strongly rooted in Neuroticism facets rather than in Conscientiousness facets. Likewise, since the histrionic PD scale was negatively correlated with Straightforwardness and Modesty, it is plausible that some of the features that comprise this PD syndrome could be more strongly associated with Agreeableness facets rather than Extraversion facets. In line with these speculations, the clinicians in Samuel and Widiger's (2004) study did rate the prototypical individual with obsessive compulsive PD as being high on several Neuroticism facets such as Anxiety, Depression and Self-Consciousness, whereas the prototypical individual with histrionic PD was rated as being low on the Agreeableness facets of Modesty and Straightforwardness.

Can Combinations of Lower-Order FFM Facet Traits Account for Variance in the Prediction of PD Features?

Consistent with previous work (Aluja et al. 2007; Bagby et al. 2005a; De Fruyt et al. 2006; Reynolds and Clark 2001; Trull et al. 2001), results across the regression analyses revealed that FFM facets as a class of predictors significantly explained between 18 % (obsessive-compulsive PD) and 49 % (avoidant PD) of unique variance in scores on the WISPI-IV PD scales. Such findings indicate that PD features to some extent can be understood in terms of a combination of key personality traits from the FFM. However, the amount of variance in PD features that was explained by FFM traits was generally modest with some exceptions and unexplained variance remained for all PDs. The implication from this finding is that constructs other than FFM traits could be relevant to understanding PDs and should be explored in future research.

In contrast to the correlational analyses where several FFM facets were significant correlates of individual PD scales (see Table 5), the regression analyses revealed that only a small number of the trait correlates were actually statistically significant predictors of the relevant PDs. For example, of the 13 FFM facet correlates entered into the regression analysis predicting narcissistic PD features, only the facets of Self-Consciousness, Values and Modesty were statistically significant predictors (see Table 6). Further, several FFM facets listed in the Widiger et al. (2002b) PD-FFM facet profiles were not statistically significant predictors of their respective PD scales. For example, Widiger et al. hypothesised important relationships between narcissistic PD and the FFM facets of Angry Hostility, Altruism and Tender-Mindedness. Although these traits were correlates of narcissistic PD features in the current research, they nonetheless had no predictive relationship with narcissistic PD features in the regression analysis. These traits were also not found to be predictors of narcissistic PD in other studies that have used regression analysis (Aluja et al. 2007; Dyce and O'Connor 1998). The implication from this finding is that while several traits may be correlated with PD features, they may not necessarily be significant predictors of PD features when the effects of other traits are taken into account. That is, some traits are more relevant for the prediction of PD features than others. Previous studies have consistently found that only a handful of traits from a broader set are significant predictors of individual PDs (Aluja et al. 2007; De Clercq and De Fruyt 2003; De Fruyt et al. 2006; Trull et al. 2001). The current finding highlights the possible need for further research on the relationships between PD features and FFM traits beyond simply examining zero-order correlations. In light of the findings of the current study and those of previous studies, there is a need for research in this area to use more powerful regression analyses in order to fully evaluate PD-FFM trait relationships because such analyses will help to identify the traits that have the most salient relationships with PD features. To this end, a methodological strength of the current study was that it included all trait correlates of each PD scale as predictor variables, rather than select predictor variables based on a priori theoretical predictions as has been done in most previous research, thereby allowing for a more meaningful examination of PD-FFM facet relationships.

The Role of Values

Another observation worth considering is the prominent role of Values as a predictor of most PD features across the PD profiles. While Openness did not obtain salient correlations with the WISPI-IV PD scales, its lower-order facet of Values was negatively correlated with a range of PD features and was also a significant negative predictor of all PDs with the exception of histrionic, borderline and avoidant PDs. Costa

and McCrae (1992) defined Openness to Values as “the readiness to re-examine social, political, and religious values” (p. 17). Low scores on this facet suggest an individual who possesses a rigid values system or ideological framework that guides how the person operates in the world and this belief system is not open to negotiation, evaluation or modification (Piedmont 1998). Attaining such a low score typically describes someone who “is dogmatic and closed minded with respect to his or her moral, ethical, or other belief system; rejects and is intolerant of alternative belief systems; may be prejudiced and bigoted” (Widiger et al. 2002a, p. 440). Although a low score on Values means that an individual holds a rigid set of beliefs, this facet offers no information about the specific types of rigid beliefs or values that are held, just the degree to which the individual is willing or unwilling to re-examine them (Piedmont 1998). Thus, it is possible that low Values may be a risk factor for the development and maintenance of inflexible dysfunctional beliefs, ideas, assumptions and values; all of which appear to be common cognitive features of PDs (APA 2000; Beck et al. 2004; McCrae 2006). Indeed, a dispositional unwillingness to re-examine rigid core belief systems or ideological frameworks may explain why PDs are notoriously difficult to treat, particularly with traditional cognitive therapy techniques, such as identifying and challenging negative automatic thoughts (Young et al. 2003).

In their hypothesised PD-FFM facet profiles, Widiger et al. (2002b) proposed that (low) Values was only salient to obsessive-compulsive PD. Yet, the results of the current study revealed that Values was an important negative predictor of most PD syndromes. This finding lends some support for the possibility that the Widiger et al. PD-FFM facet profiles could be better conceptualised for some PDs (Huprich 2003). It is difficult to compare and discuss the predictive role of Values within the context of previous research because most studies that have used regression analyses to explore the FFM trait predictors of each PD (e.g., Bagby et al. 2005a; De Clercq and De Fruyt 2003; De Fruyt et al. 2006; Reynolds and Clark 2001; Trull et al. 2001) have only entered trait predictor variables based on a priori hypothesised relationships, such as the Widiger et al. (2002b) PD-FFM facet profiles, where Values has no prominent role. However, Aluja et al. (2007) entered all 30 FFM facets as predictors of each PD using stepwise regressions and found that Values was a significant negative predictor of schizoid, obsessive-compulsive and paranoid PD symptomology in a non-clinical student sample. Further, Reynolds and Clark (2001) found that low Values was the primary predictor of the SNAP maladaptive personality trait of Propriety, which contrasts a preference for conservative morality with the rejection of social rules and convention. In turn, Propriety has been associated with paranoid, schizoid, schizotypal, antisocial, borderline, avoidant,

dependent, obsessive-compulsive and passive-aggressive PDs in previous research (Clark et al. [in press](#); Hurt and Oltmanns 2002; Morey et al. 2003; Wolf et al. 2011). Thus, it could be argued that while the broad personality domain of Openness may have little relationship with PDs, some of its lower-order facets, notably Values, may be salient to specific PD features. The implication is that lower-order traits could provide clinicians and researchers with a more comprehensive picture about an individual's personality pathology in contrast to that which is provided by higher-order traits (Reynolds and Clark 2001). Therefore, future research should explore all possible relationships between lower-order traits and PDs, rather than only a priori hypothesised relationships.

Limitations

The findings of this study should be interpreted in the context of some limitations. First, although the study involved a relatively large non-clinical sample with an adequate gender balance, the participants were primarily university students with relatively high levels of education. Future studies should consider examining the relationships between the FFM traits and PD features in more diverse samples, such as heterogeneous community samples or clinical samples involving participants diagnosed with PDs, so as to ensure the wider generalisability of results. A related issue is that the non-clinical nature of the sample may have reduced the variability in scores on the study variables, all of which were dimensional constructs. Utilising clinical samples could help to ensure that adequate variance is sampled for all variables. Second, since the study employed a cross-sectional and correlational design no conclusions can be made regarding causal relationships amongst the variables. Longitudinal studies are needed to examine how FFM traits are causally related to the development of PDs. Third, another potential limitation of this study could be the use of NEO-PI-R *T* scores rather than raw scores. Although the test convention is to use *T* scores, some personality researchers may prefer the information gained from raw scores. Finally, since all variables were measured through self-report methods, the possibility that shared method variance could have influenced the results cannot be ruled out. Due to limited research about PD-FFM facet trait relationships using the full WISPI-IV, the findings of this exploratory study need to be viewed with caution until future replication.

Conclusion

This study demonstrated that FFM personality traits were meaningfully related with theoretically-relevant PD features, as measured by the WISPI-IV, in a non-clinical analogue

sample. Notably, this study showed that FFM traits could explain moderate proportions of variance in PD features; however, unexplained variance remained. The results also revealed that each PD syndrome was associated with its own profile of a unique combination of dimensional FFM facet predictors. These are significant findings which could have theoretical and practical implications for the conceptualisation of PDs.

Conflict of Interest Ninawa Butrus declares that there is no conflict of interest; Rivka T. Witenberg declares that there is no conflict of interest.

Experiment Participants The research protocol was approved by the University's Human Research Ethics Committee.

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